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CHALCID CORNER—AN INTERACTIVE IDENTIFICATION APPLICATION FOR THE FAMILIES OF NORTH AMERICAN CHALCIDOIDEA (HYMENOPTERA)

Michael E. Schauff

Systematic Entomology Laboratory, USDA, PSI, U.S. National Museum, NHB 168, Washington, DC 20560

Abstract.—An interactive identification software application has been written to assist non-experts in the identification of the families of Chalcidoidea (Hymenoptera) of North America. This program allows the incorporation of embedded graphics, sound, visual effects, and other features not possible with conventional hard-copy publications. The program allows the user to choose from a list of alternative questions about chalcids and then proceed through a series of screens to make identifications, confirm tentative identifications, review biological and taxonomic information on a particular family, or review information on the superfamily as a whole.

One of the challenges facing systematists, especially those working for organizations whose mission includes education, service, or ties to a particular user group (such as U.S. Agriculture), is to make the information contained in the products of our research available to a wide array of non-systematists. One criticism often leveled at systematists is that the only people who can understand or make use of the end product of systematics research are other systematists. Often referred to as "Technology Transfer," making the results of systematics research more widely available means that scientists and educators in related disciplines can more easily draw on the accumulated expertise of the systematist to solve their own problems without the direct intervention of the systematist. The most familiar such situations are the service identifications provided by a majority of systematists for colleagues in biological control, ecology, integrated pest management, and to regulatory agencies.

Recently, the author was part of a research project that produced "The Handbook of the families of North American Chalcidoidea (Hymenoptera)" (Grissell and Schauff 1990). An outgrowth of nearly 10 years of teaching the basics of chalcid identification to over 250 students, the handbook was designed for ease-of-use by non-experts whose only prior experience with this difficult group of minute wasps may have been basic courses in insect identification. Its aim was to simplify the identification of chalcid families through the use of a pictorial key, which relied heavily on illustrations, and short, concise summaries of biological and taxonomic information that would provide an alternative to more traditional (and more difficult) keys. During the production of this paper, it became obvious that recent computer technology made it possible to present some of this same data in a format that would not only heavily rely on graphics, but could also take advantage of sound, embedded graphics, visual effects, and the easy "point and click" ability of todays personal computers. Many of these

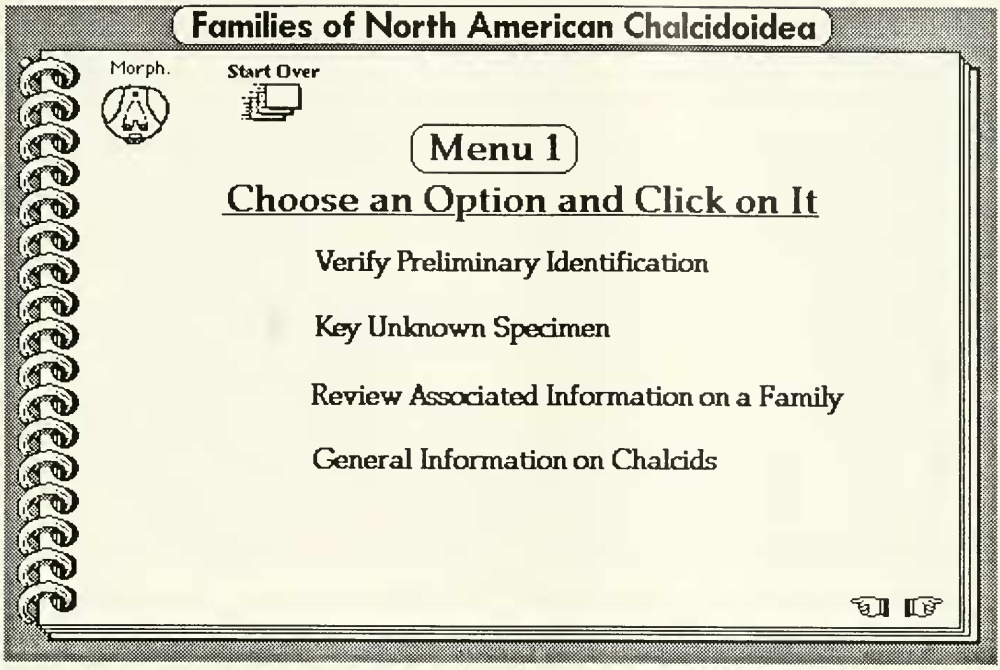

Fig. 1. Menu 1, the main selection menu.

features are not possible in conventional hard-copy publications.

To implement this idea Hypercard® application development software supplied with Apple Macintosh computers was chosen. Hypercard is sometimes referred to as a "software erector set" (Goodman 1990) or personal application development software, meaning that it is a software program which allows the user to design and implement his/her own programs. The most frequently used analogy to explain how Hypercard functions is that of a stack of electronic filing cards. Each "stack" (program or application) generally consists of a number of linked "cards" (screens or windows). Each of these cards may contain a variety of text fields, "buttons," and graphics which can be programmed to perform whatever functions the author desires. As in any programming environment, these instructions may be simple (finding the next card) or complex (searching and reporting on a database).

Since its introduction in 1987, Hypercard has been used by hundreds of authors to generate thousands of applications in fields as diverse as financial management, entertainment, education, and, of course, science. In systematics Hypercard has been used to produce sophisticated collection data bases, while in general entomology it has been used to present a general introduction to insects and their biology. While many of these stacks are marketed commercially, hundreds are in the public domain.

The "Chalcid Corner" stack allows the user to choose among four alternatives at the beginning of the program (Fig. 1): 1) Verify a preliminary identification; 2) key an unknown specimen; 3) Browse associated information on a particular family; and 4) review general information on the families of Chalcidoidea. Each choice is executed by "clicking" on the text of the choice. At all times during the use of the program morphological help can be accessed by clicking on the small chalcid head in the

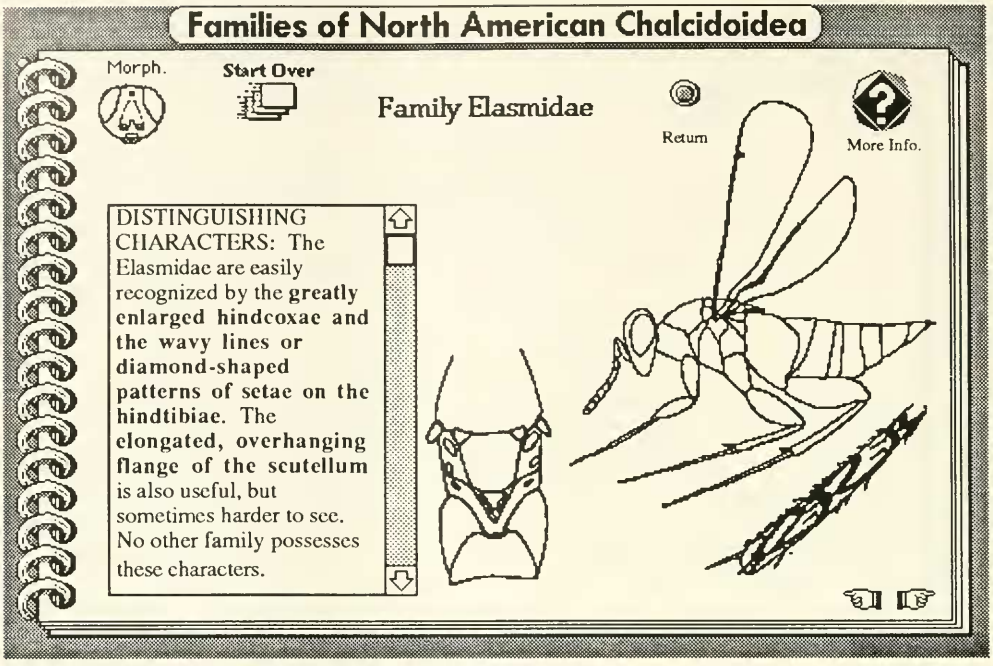

Fig. 2. Differential Diagnosis screen for family Elasmidae.

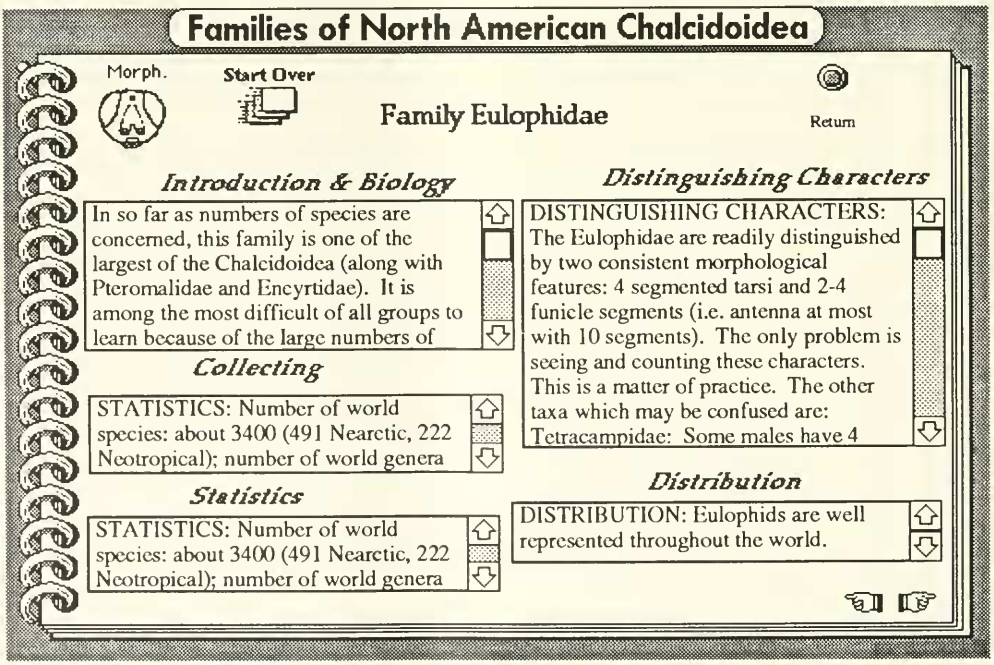

Fig. 3. Associated Information screen for family Eulophidae.

upper left hand corner of the screen and a user can go back to the start of the program by clicking on "start over." The key features the use of embedded picture windows. The advantage of this feature is that when a user wishes to view an illustration (denoted in the key by "(Fig.)," clicking on the text causes the illustration to be displayed in its own window on top of the key. Unlike traditional keys, the user does not need to search through the document for the illustration or even match up the figure numbers to see the information needed. Following key couplets are reached by clicking on the number of the couplet that the user wishes to advance to and when a family determination is reached, clicking on the family name automatically takes the user to a differential diagnosis screen which contains additional graphics and text (Fig. 2). This screen is linked to additional information on the family by clicking on the "more info" button. Associated information on collecting, biology, distribution, etc., is presented in "scrollable" fields (Fig. 3), which allows more text to be assigned to any given field than could normally be accommodated on one screen. The stack treats 20 families of Chalcidoidea for North America and lists over 200 references.

The software and installation instructions are free and can be obtained by sending 3 double-sided double-density 3½″ diskettes (do not send 5¼″ disks) to the author at the address given above.

Literature Cited

Grissell, E. E. and M. E. Schauff. 1990. The Handbook of Families of North American Chalcidoiea. Handbook Entomol. Soc. Wash. 1: 85 pp.

Goodman, D. 1990. The Complete Hypercard 2.0 Handbook, 3rd Edition. Bantam Books, New York. 892 pp.